



Unscrambling digital TV

Paul I. Brown-Kenyon, Alan Miles, and John S. Rose

Digital television will cause a revolution in the TV industry—but not, perhaps, the revolution its government promoters intended.

Digital television (DTV) is defined in two quite different ways, and they are often confused. In one sense, it refers to the digital transmission of television signals by TV operators. But in the other, it means several relatively new TV formats—for example, high-definition television (HDTV) and interactive television (ITV)—that digitization renders more feasible.

Digitizing TV signals for transmission makes eminent sense because this increases the capacity of today's transmission technologies. As a result, digital transmission is spreading fast. Yet there is little reason to expect every new digital-TV format to catch on as quickly; in fact, HDTV may never amount to much, while all digital formats face tricky technical and economic hurdles.

The difference between the two aspects of digitization should be understood by everyone connected with the industry: operators of TV systems, content providers, viewers, and, in particular, governments, many of which are basing policy decisions on unsubstantiated beliefs about how to transmit digital TV

Paul Brown-Kenyon is a consultant in McKinsey's Hong Kong office; Alan Miles is a consultant and John Rose is a director in the New York office. Copyright © 2000 McKinsey & Company. All rights reserved.

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signals and what digital services should be offered. In some countries, including Australia, Taiwan, and the United States, governments are giving away broadcast spectrum valued at tens of billions of dollars for DTV uses that in hindsight may not make sense. Even so, the concurrence of digital transmission and digital formats will probably turn the TV industry upside down.

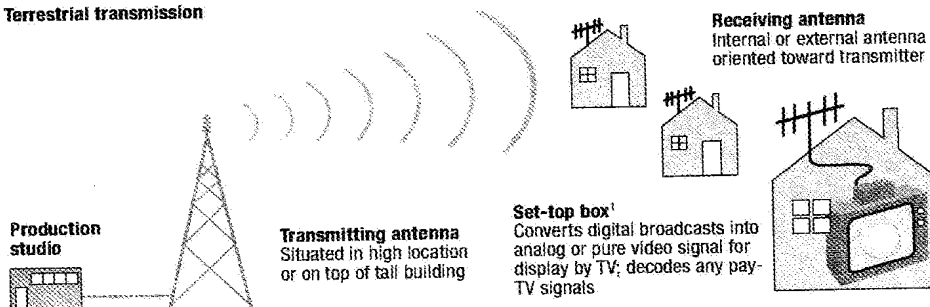
Transmission

Television pictures are transmitted into homes by means of three main technologies: terrestrial, cable, and satellite (Exhibit 1).

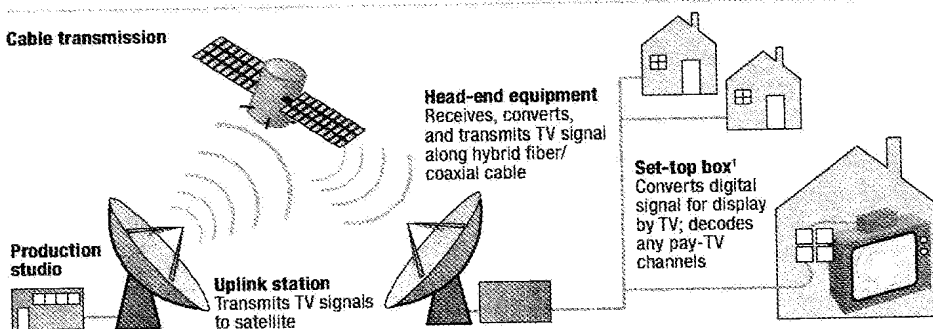
EXHIBIT 1

Television transmission paths

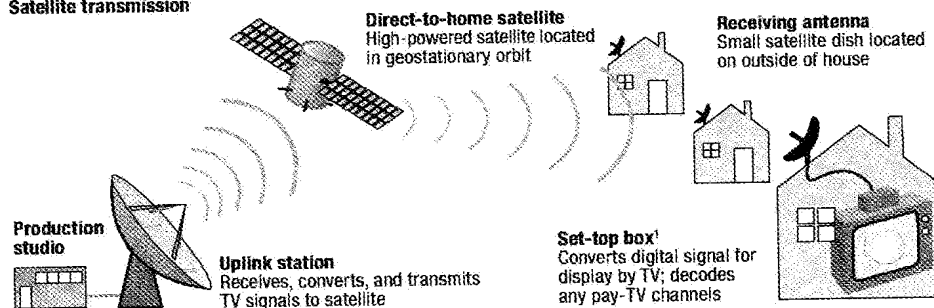
Terrestrial transmission



Cable transmission



Satellite transmission



¹Required only for digital transmissions or for premium service.

TV became a mass medium in most countries during the 1950s through terrestrial, or over-the-air, broadcasting—a fairly cheap and simple way of delivering TV signals using locally available radio spectrum. Since regulators allocate a fixed amount of spectrum, which has to be shared by broadcasters in adjacent areas, only a limited number of channels can be broadcast over the air in a given city or region. The reception of terrestrial signals can also be a problem: obstructions and long distances cause them to degrade. Viewers in built-up areas such as New York City may get fuzzy pictures, while those in areas distant from transmitters may get no clear terrestrial signals whatsoever.

Cable television was first developed to deliver TV signals to small, isolated communities and later used to increase the number of channels available to viewers. Since cable TV provides a dedicated “pipe” with more usable bandwidth than regulators allocate to terrestrial broadcasters, cable operators can offer subscribers many more TV channels, normally with clearer pictures because there are no obstructions. Cable systems, however, cost a lot of time and money to build, and since their returns depend on the density of subscribers, few rural households have access to them.

More recently, high-powered direct-to-home (DTH) satellites have started providing coverage to all households equipped with small receiving dishes in the areas that satellites can “see.” Most DTH systems have access to large chunks of spectrum and are already digital, so they can offer a wider selection of channels than can analog cable. (Digital transmission takes up less bandwidth than analog.) Returns depend largely on the fixed cost of the satellite and the variable cost of the customers’ equipment (the dish and the decoder box on the television). Satellite TV can thus reach rural and urban households at the same expense, but households in built-up areas may have difficulty finding space to install receiving dishes.

The technical impact

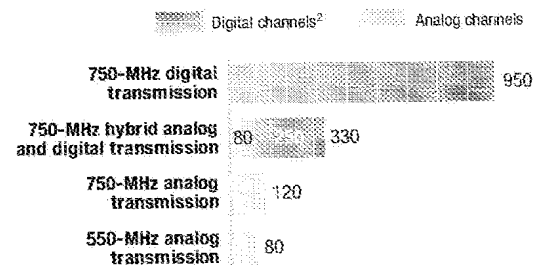
An analog TV channel requires six megahertz of spectrum no matter how its signals are transmitted. The

TV became a mass medium in most countries during the 1950s through over-the-air broadcasting

EXHIBIT 2

Cable operators go digital

Channel capacity from spectrum upgrade,¹ number of channels



¹50 MHz of spectrum (for both 550-MHz and 750-MHz transmission systems) is set aside as a return path for interactive services.

²Assumes 256 QAM (quadrature amplitude modulation) with eight SDTV channels per 6-MHz slot.